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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,163	09/23/2002	Thomas Alan Early	040849-0192	4876

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WASHINGTON, DC 20007

EXAMINER

GAKH, YELENA G

ART UNIT	PAPER NUMBER
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1743

DATE MAILED: 02/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/065,163

Applicant(s)

EARLY ET AL.

Examiner

Yelena G. Gakh, Ph.D.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☒ Claim(s) 13 and 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 092302.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. The specification is objected to as not containing a written description of the invention "in such full, clear, concise, and exact terms as to enable any person skilled in the art to ... to make and use the same and shall set forth the best mode". In particular, the specification discloses an example of applying the method of the instant application to a quantitative NMR analysis of a mixture of three relatively simple organic compounds: 2,4,6-trimethylphenol (mesitol), diethylphthalate and menthol, ^1H and ^{13}C NMR spectra of which are depicted on Figures 1 and 2. However, on page 7, paragraph [0024] the reference is made to "20 mg of polymer" which "were dissolved in 0.5 ml of CDCl_3 " for ^1H NMR and "about 250 mg of sample along with about 50 mg of $\text{Cr}(\text{acac})_3$ were dissolved in 3.5 ml CDCl_3 " for ^{13}C NMR. It is not clear, what is this polymer, since no polymer was mentioned earlier in the Example, or what happens to this polymer further, since in "Results" on page 8 [0029] the specification returns back to the mixture of three small organic compounds? It is not clear, if a part of the specification, which relates to the polymer sample is missing, especially in the light of claims 12 and 20, which recite a polymer "comprising a soft segment BPA polycarbonate", which has not been mentioned in the specification at all. Clarification of the specification is required.

Claim Objections

3. Claims 13 and 21 are objected to, since peptide cannot be listed in the group of polymers, as it is not a polymer.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-10 and 14-16 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the case, when two or more components are not “distributed identically in the integral packets, i.e., the matrix A has two or more identical columns”, does not reasonably provide enablement for the latter very common case. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. As indicated by the inventors themselves, if two or more components are distributed evenly in the integral packets, “only the sum of concentrations of these two components can be calculated. Likewise, if the integral distribution of a component is a linear combination of the integral distribution of other components, then that component concentration will not be uniquely determined. In these cases, A and x need to be restated in terms of the new, reduced set of x” (Specification, page 4, paragraph [015]), which does not make sense in the case of a two-component system. Therefore, the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims.

The specification is further enabling only for NMR spectra, for which signals are assigned at least to specific types of groups (e.g. methyl, methylene, methine, quaternary carbon, etc.) for each mixture component so that “identifying the number of nuclei that contribute to the integral data of said resonance packets” could be performed.

Regarding ^{13}C spectra the specification is enabling only for the spectra obtained under special conditions and for mixture components of similar structure, since relaxation times determine the integral intensities of the signals, see e.g. Mareci et al. (1977), Yamazaki et al (1978), Alger et al. (1979), Laude et al. (1986).

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6. Claims 12-13 and 20-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not provide enablement for the method for determining the relative concentration of two or more components in a sample containing a mixture of polymers, especially proteins. It is well known in the art, that assigning signals to at least specific groups in protein NMR spectra, which is a necessary step for performing the instant method, requires special techniques, such as multi-dimensional and/or relaxation experiments, including isotope enrichment of samples. The examiner is not aware of any reference providing assigning ^1H or ^{13}C signals for protein molecules just from 1D NMR spectra, not mentioning the mixtures of proteins; no references could be found which provide information on the content of protein mixtures from 1D spectra. Moreover, no references indicate possibility of quantifying mixtures of complex compounds by applying linear regression analysis. Even spectra of mixtures of much simpler compounds require application of vigorous mathematical analysis, such as principal component analysis or neural network, see e.g. Wilson et al. (1989), Cheng et al. (1997, IDS), Amendolia et al. (1998), Alam et al. (2000). No examples of such quantitative analysis of proteins or synthetic polymers, including BPA polycarbonate, are represented in the specification.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 11-13 and 17-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims recite "determining the relative concentration of two or more components in a sample", wherein "said sample comprises a polymer". It is not clear, which two or more components are meant here, if only one polymer (except for co-polymer) is present in the sample, especially if this polymer is a protein or a polypeptide.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. **Claims 1-2, 4-5, 7-10 and 14** are rejected under 35 U.S.C. 102(b) as being anticipated by Warren et al. (J. Pharm. Sci., 1976).

Warren teaches a “quantitative NMR analysis of a four-component mixture of phenylglycine derivatives”, comprising: obtaining ¹H NMR spectrum of the sample; identifying resonance packets from the spectrum, integrating said resonance packets; identifying the number of nuclei that contribute to the integral data of said resonance packets; and determining the relative concentration of each component in said sample based on the integral data and on the number of nuclei (the whole text, especially Table II).

11. **Claims 1-11, 14 and 17-18** are rejected under 35 U.S.C. 102(b) as being anticipated by Landucci et al. (Holzforschung, 1998).

Landucci teaches ¹³C NMR quantitative spectroscopy for determining concentration of components in a mixture of polymers using resonance packets integrals and assigned signals with known contribution of particular nuclei to specific resonance packets and involving linear summation over corresponding spectral regions: “it is informative to compare the quantitative spectra along with integrals of carbon regions as shown in Figure 8. To obtain the integral values for the G-DHP it was assumed that the aromatic region contained 6.00 carbons plus a correction value (0.4) calculated for the presence of two unsaturated carbons (α and β) due to about one CA end group for every 6 C9 units (~17%). All of the other integrals in the spectrum are based upon these assumptopns. It can be seen from the Figure that the sum of the aromatic and aliphatic regions total 10.0 carbons, which is expected considering one methoxy/C9 unit” (page 168, left column).

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Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. **Claims 15-16, 19 and 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Landucci.

Although Landucci does not specifically disclose applying method to solid state NMR or implementing it in a quality assurance process, it would have been obvious for anyone of ordinary skill in the art to do so, because solid state NMR carries the same problems as solution NMR of polymer mixtures, i.e. the spectra have broaden and overlapping lines, for which the same principles that are used by Landucci can be easily implemented; quantified NMR is routinely applied for quality assurance processes.

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Conclusion

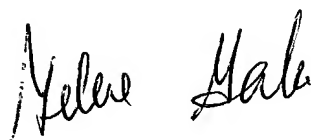
16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. *Mazzoni et al. (Magn. Reson. Chem., 1997)* teach a method for direct qualitative and quantitative analysis of carbohydrate mixtures using ^{13}C NMR spectroscopy, using integrals of α -protons.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1700.

Yelena G. Gakh
1/23/04

A handwritten signature in cursive script, appearing to read "Yelena Gakh".